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Workplace Hazards and Prevention Options From a Nonrandom Sample of Retail Trade Businesses

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Abstract

Employer commitment is a key factor in an effective safety program, yet limited research has focused on the safety priorities of retail store managers. To address this, the U.S. National Institute for Occupational Safety and Health recruited 4 experienced ergonomists, who met and interviewed 9 retailers in different parts of the eastern USA. The reports from the 9 interviews were used to document the hazards facing retailers and the interventions they attempted. Those interviewed were managers/owners of establishments that ranged from a small bakery with 11 employees to a supermarket with 85 or more employees. The main hazards across all establishments included overexertion, contact-with-objects, and falls-to-the-same-level. We also compared the retailers' perceptions of safety hazards with injuries from actual hazards as supplied by the U.S. Bureau of Labor Statistics. This report provides insight into the retailers' perceptions of safety hazards as well as their commitment to the prevention of workplace injuries.

Keywords

hazards; interventions; engineering controls; ergonomics; manual materials handling

1. INTRODUCTION

The National Occupational Research Agenda (NORA) and a broad array of industry, academic, and government partners are examining work-place safety and health. NORA is a national effort conceived by the National Institute for Occupational Safety and Health (NIOSH) to develop industry-specific strategies for safety research and prevention programs [1]. The wholesale and retail trade (WRT) sector is one of the 10 industry sectors included in NORA.

From 2006 through 2009, the WRT sector represented ~15% of the private sector work population, yet accounted for ~20% of nonfatal injuries and illnesses [2]. Since over this 4-

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Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the National Institute for Occupational Safety and Health. Mention of any company or product does not constitute endorsement by NIOSH. In addition, citations to Web sites external to NIOSH do not constitute NIOSH endorsement of the sponsoring organizations or their programs or products. Collaborators who are not co-authors: Herb L. Linn, who assisted in developing charts and the outline. The four experienced practitioners who conducted the interviews and prepared their reports included W. Garry Allread, Robert Arndt, Kermit Davis, and John Mroszczyk.

year interval, the retail sector had twice as many injuries as the wholesale sector, we focused this project on the retail sector. One phase of our strategic plan was to obtain input from retail employers, owners, and/or managers to gain their perspective and commitment to safety and prevention practices.

The U.S. retail sector consists of over 665 000 firms with over 14 million employees working in 1.1 million retail establishments [1]. Slightly over 400 000 of those firms or ~60% have four or fewer employees working at a single establishment. Approximately 2000 retail firms have 500 or more employees, and these firms operate 320 000 establishments [3]. One prominent retail firm has over 4000 establishments [4]. With the exception of the chain or franchised business, each establishment is unique. The retail establishments differ in size, type of merchandise, number and bulk of products, and physical nature of the workplace (e.g., warehouse, office, or store) [5]. The establishments also differ in their rates of injuries and lost time. Most retail businesses have low rates of injuries and lost time, but there is a subset of retail businesses with injury rates nearly double the average for all retailers [2]. These include, but are not limited to, supermarkets, department stores, home centers, general/used merchandise stores, and nursery/garden centers.

In the early 1970s, NIOSH investigated the characteristics of successful safety programs. The one factor common to all successful safety programs was employer commitment [6, 7]. More recently, Huang, Leamon, Courtney, et al. conducted a national random survey across industries to determine how corporate-level decision-makers perceived workplace safety [8]. They found corporate executives were more than just committed to safety; they actually recognized workplace safety as a potential profit center, such that for every dollar spent improving workplace safety, over USD 4 were realized in profits. They also identified over-exertion as the number-one safety concern [9].

Research conducted on safety climate provides another approach for studying workplace safety. Employees were asked survey questions to assess how their employer's behavior affected their perception of safety [10]. The rationale was that the employees can determine how committed their employers are to safety by observing how their employers respond to workplace hazards. Establishments with a strong safety climate purportedly had employers who believed in and practiced safety [11]. Those establishments with positive safety climates also experienced reductions in injury rates and lost time [12]. Similarly, Griffiths demonstrated that when safety was managed with the same level of oversight and commitment as was given to processes such as manufacturing, finance, and sales, the injury rates and lost time declined, often by as much as 90% for back injuries alone [13].

The purpose of this formative project was to develop a better understanding of the retailers' views regarding workplace safety hazards and the prevention of worker injuries. This was a first attempt to interview a subset of retailers about safety hazards and interventions for public presentation. Here, we present what we learned from the interviews with nine retail store managers. We also compared the retailers' perceptions of safety hazards to those safety

[1]An establishment is a single business location belonging to a company or firm that is engaged in a single activity. A supermarket chain is an example of a firm or a company with multiple local stores or establishments.

hazards listed in the 2009 Bureau of Labor Statistics (BLS) survey of occupational injury/illness (SOII) [2] [14].

2. METHODS

2.1. Ergonomists

We recruited four experienced ergonomists who responded to NIOSH announcements through professional associations. Each ergonomist worked in a different geographical region or state to reduce the potential of overlap and to ensure geographical distribution. We also selected ergonomists who had experience in working with businesses on safety-related issues.

Each of three ergonomists met and interviewed two retailers; the fourth ergonomist met and interviewed three retailers. In all, the four ergonomists provided NIOSH with nine reports on nine unique retailers[3]. The term "retailer" is used here as a generic substitute to refer to an employer, owner, or manager of a retail establishment.

2.2. Procedures

Fontana and Frey suggest when planning a study with a new or specialized population, e.g., retailers, that researchers consider using open-ended questions, akin to a conversation [15]. Open-ended questions are less threatening than a long structured interview because they allow the participant to provide the context for their answers. Open-ended questions also allow the interviewer to follow-up on comments with additional questions to clarify the problem [16].

Each practitioner in the initial contact with the retailer, usually by phone, provided the following introductory statement [4]:

> The National Institute for Occupational Safety and Health is seeking information about the nature or type of safety hazards that are encountered at retail work sites, such as your own. We are interested in finding out your views concerning workplace safety hazards, and what, if anything, is done about them. All participation is voluntary and all comments will be confidential to protect you, the establishment, and firm, to the extent provided by the privacy laws [5]. This information will be used to assist NIOSH develop information products that will provide solutions for those hazards that retailers find the most burdensome and that pose an increased risk of injuries to the employees.

Figure 1 illustrates the series of steps that the practitioner followed.

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[2]The BLS safety hazards refer to Table R8, the list of events/exposures for lost time injuries, for each of the nine retail businesses in this report: http://www.bls.gov/iif/oshwc/osh/case/ostb2454.pdf.

[3]For this project, we were limited to nine retail participants. The project was viewed by Human Subjects Review Board (2005–2006) as an information gathering effort to develop an agenda for preventing injuries in the WRT sector.

[4]The practitioner would preface their remarks with a short statement distinguishing between the U.S. Occupational Safety and Health Administration (OSHA) and NIOSH.

[5]If one or more safety hazards were judged egregious by the practitioner, i.e., would put employees at risk of an immediate fatal or nonfatal injury, the hazard would be reported to OSHA.

Step 1. Identify retail informants. The practitioner discussed the points in the introductory statement to be sure the retailer fully understood. If the retailer was willing to participate, the practitioner would arrange, usually by phone, a meeting at the retailer's establishment. The diamond shaped figure in Figure 1 illustrates the decision point for the potential participant as to whether they would agree to be interviewed.

Step 2. Explain project to retailers. The practitioner met with the retailer at their establishment. This served as the get-acquainted step in the process and usually involved a tour of the facility and an opportunity for the practitioner to see the store layout and meet employees.

Step 3. Solicit views on safety hazards. Once a comfort level had been established between the retailer and practitioner, the first question was raised: “What do you as the manager/owner of this establishment consider the important safety hazards?” Typically, the practitioner would need to follow-up and ask for examples or elaborate on what they meant by a comment regarding a safety hazard. This was often the most difficult part of the interview. If the retailer had an active safety program, then it was plausible that the retailer would have more comments than a retailer in whose establishment safety issues were seldom addressed.

Step 4. Solicit views on The second part of the question was raised: “What do you as the manager/owner hazard of this abatement. establishment consider as effective solutions to workplace hazards or what types of solutions would you want to try, i.e., ‘your needs?’ ”. Similarly, if the retailer had been active in seeking solutions to the store's safety problems, the retailer would be inclined to discuss various interventions they had tried, considered, or needed.

Step 5. Collect 2009 BLS surveillance data from the subset of North American Industry Classification System (NAICS) codes that matched each of the nine establishments that were interviewed. This allowed a direct comparison between each retailer's perception of injury types, injury sources, and the events/exposures with what was found when all similar establishments were surveyed by BLS.

BLS data on fatal/nonfatal workplace injuries and illnesses come from the annual SOII. This database is populated by a sample of nearly 300 000 establishments from a population of 7.3 million. Each injury/illness incident is described on a BLS form to ascertain the “case characteristics” of the injury/illness. The case characteristics include the nature of the exposures/events and the sources/causes for the recorded injuries/illnesses [17]. To classify the unique business entities, BLS use codes provided by NAICS. The NAICS codes are based on the primary economic function of the business entity [18].

3. RESULTS

3.1. Overview

Each ergonomist initially identified 5–10 retailers who were considered good prospects for the project. The four ergonomists contacted 32 retailers to find nine who were willing to participate, for a response rate of 28%. Eleven said they were not interested. Eight said they could not get approval from upper management. Three did not return the follow-up calls.

There was no clear evidence that NIOSH's role in funding the project had any effect on the retailers' willingness to participate. Initially, we thought that larger establishments would be less willing to participate than smaller ones, but this did not turn out to be the case when we looked at the data.

The nine retailers who participated each managed one establishment. Two establishments were privately owned. Seven establishments either were owned by a large firm or were franchises. The large firms and franchises accounted for over 6500 stores spread across the eastern half of the USA. For each establishment, the number of employees ranged from 12 to 85 full time equivalent (FTE) employees. The following retail establishments were included in this project: farm supply, grocery store, supermarket, convenience store, bakery, department store, mail order store, office supply store, and used merchandise store. One establishment was unionized. There were no discernible differences distinguishing the unionized shop from the others.

3.2. Hazards and Interventions

Two independent and experienced investigators reviewed the nine reports supplied by the four ergonomists. Table 1 presents the key aspects of each retailer's comments regarding the safety hazards and the nature of the interventions. All comments were either direct quotes or simplified versions of their individual comments. They are shown in the order in which they were discussed.

In response to the first question soliciting information about safety hazards, all but one retailer mentioned manual lifting as the first or second most common hazard as listed in Table 1. Trips, slips, and falls were identified by six of the nine establishments. Repetitive motions were also mentioned by five retailers. Other hazards that were identified included lack of machine guarding, electrical, contact with objects, awkward postures, and prolonged standing. In response to the second question inquiring about solutions or interventions, each retailer described an array of solutions or needs tailored to each of their nine businesses [6]. Table 2 provides a summary of the solutions and needs drawn from Table 1.

Table 2 is organized into three categories: administrative changes: instituted polices, administrative changes: conducted training, and engineering changes. The most frequently mentioned intervention dealt with reducing the impact of manual materials handling (MMH). The interventions were organized as either an administrative policy, some form of training, and/or engineering changes. Table 2 provides a convenient list of potential solutions or interventions that were implemented or were being considered as potential interventions for safety hazards found in these nine retail establishments.

Many of these solutions are generic enough to apply to similar businesses.

In implementing engineering changes, cost is often the prohibiting factor in the purchase of new equipment. In addition, the new equipment may require training to ensure the proper use and maintenance of the device(s) [19]. Fortunately, there are a number of online cost–

[6]Three retailers could not list any additional needs or ideas for future improvement regarding safety hazards.

benefit calculators to assist in such computations. These calculators provide valuable information on overall cost and the payback periods [20]. The success of any intervention, however, depends not only on the effectiveness of the intervention, but also on the implementation strategy [21]. We have learned elsewhere that a successful intervention strategy will depend on employee participation in addition to employer commitment [22, 23].

3.3. Incidence Rates (IRs) and Case Characteristics

Table 3 includes IRs from SOII for each retail subsector that was interviewed: farm supply, grocery/supermarket (accounting for two entries), convenience store, bakery, department store, mail order merchandise, office supply store, and used merchandise store. The IRs ranged from a high of 213.8 per 10 000 for the farm supply subsector to a low of 62.4 per 10 000 for the bakery subsector [7]. Although not shown, the 2009 bone fracture rate for the farm supply subsector was 54.4 per 10 000. Convenient stores also had high incidence rates of fractures at 30.8 per 10 000. As for body parts, the trunk had the highest incidence rate followed by both the upper and lower extremities.

3.4. Hazard Events, Injury Types, Sources

Of the six hazard events listed in Table 3, two of them, namely, contact-with-object and over-exertion, had the highest IRs across all of the retail subsectors as well as nearly identical IRs across the retail subsectors. Falls-to-the-same level had the third highest IR. The most common types of injury among retail workers included sprain, strains, soreness, bruises, contusions, punctures, cuts, and general back pain. The source of the injuries in the retail workplace were moving vehicles, such as forklifts, or a body part struck against a pallet or a heavy container, as well as injuries from handling or carrying parts, materials, and containers. Pushing or pulling a heavy cart or a loaded pallet jack on an uneven floor surface can also generate ligament sprains and muscle strains. The two most prominent hazard sources were containers and floors. If the nature of the injury is laceration of the leg, the event recorded is contact-with-object. If the nature of the injury is muscle sprain and the site is the trunk or back, the event is labeled overexertion.

4. DISCUSSION

4.1. Study Implications

Management commitment is a cornerstone of an effective safety program. Yet, we have had limited knowledge of the retailers' commitment to safety. This formative project explored the concept of management commitment to safety at the establishment level. The conclusion, derived from the nature of each of the nine retailer's comments in Table 1, was that safety was an important component in managing their business. We expected this finding given the nature of the selection process. The second finding underscored the importance of hazards associated with MMH (overexertion). Each of the nine retailers commented more about MMH problems than any other hazardous exposure including falls

[7]Incidence rates are based on days-away-from-work from injuries/illnesses incurred per 10 000 FTE workers.

and contact-with-objects. As expected, MMH is a well-recognized and common job activity for retail workers [8] [24].

MMH and, more specifically, the topic of over-exertion continue to occupy the interest of management at all levels including those at the corporate level. Huang and et al.'s work supports the importance of addressing overexertion injuries based on their survey of over 400 corporate executives across all sectors [9]. These findings were also consistent with what other researchers reported in similar studies about workplace hazards [25, 26].

A main reason that upper management perceives an overexertion (lifting) hazard as a potential chronic injury/illness problem—worthy of attention—is likely due to the high cost and duration associated with musculoskeletal disorders as compared with the cost of contact-with-object injuries. If surgery is involved, the cost of an overexertion injury from a back strain can range, in 2005 USD, from USD 10 000 to 70 000; whereas a contact-with-object injury is generally less costly and, in 2005 USD, under USD 5000. Contact-with-object injuries usually manifest as a bruise, cut, or puncture wound and, if treated properly, are less likely to end up as a chronic and costly injury. In Washington state, work-related musculoskeletal disorders, including overexertion injuries, accounted for 41% of the claims with a claim rate of 52 per 10 000 FTE and a median cost of USD 11 000, whereas struck-by or contact-with accounted for only 16% (20 per 10 000 FTE) with a median cost of USD 4500 [27].

4.2. Impact of Employment Changes

In addition to changes in the size of the stores and the amount of merchandise handled, the work-force has also undergone important changes over the past two decades. Newly hired employees are more likely female and ethnically diverse; whereas the permanent employees are experiencing aging issues [28]. Even the nature of employment has changed to more temporary relationships emphasizing part-time work. Contingent work often benefits employers where work requirements are more cyclical, allowing for downsizing. Contingent work may benefit younger workers/students seeking short-term employment, but usually offers no assurance of a stable weekly income [29, 30]. Given the new workforce demographics with fewer workers required to do more jobs, and the increasing volume of products to be handled, it is clear that back injuries associated with MMH continue to be the nation's number-one workplace safety problem [26, 31].

4.3. General Limitations and Assumptions

This was a formative research project with a sample size limited to nine. As a result, the findings listed in Tables 1–2 should be considered for what they are—an insight into the perception of nine select retailers as to what constitutes safety hazards and what, if anything, was done about them.

One finding, somewhat ancillary to the project's main purpose, was the difficult task of finding retailers willing to participate in the project. This finding was consistent with the

[8]Standard occupational code (SOC) 43-5081.01 for retail workers.

outcomes from other surveys of managers [32]. As a result, the retail selections are skewed on two levels: (a) the practitioners were asked to select retailers who had displayed an interest in safety and (b) retailer participation was voluntary. We also learned that retailer participation appeared to be contingent upon three factors: (a) the retail establishment usually had a record of satisfactory or better safety history than others in the same subsector; (b) the establishments were considered successful and even growing; and (c) the participating retailers acknowledged at some level they were concerned about safety and the well-being of their workforce, i.e., demonstrating high levels of employer commitment. In short, identifying retailers willing to talk about safety hazards is problematic. The findings from this project also demonstrate that there are retailers who are genuinely concerned about safety; how representative that may be is a question for a more ambitious survey than was conducted here.

4.4. Further Directions and Experiments

Future projects of this kind may want to factor in a selection strategy that accounts for the rates of rejection. Participation rates will depend on the nature of the "exchange" between the project manager and the participating retailers [33]. To encourage participation, a social or monetary exchange of some nature must be provided. One example is an offer to provide the retailer with a professional safety audit in exchange for their thoughts on safety hazards and abatement plans. Another possibility is to collaborate with the workers' compensation carriers to provide an incentive for participating on the project. Finally, the investigator needs to be clear in communicating what type of information is necessary and how it is going to be collected.

4.5. Implications/Significance of the Study

Almost all retail store employees are expected to lift and/or carry materials/merchandise as part of their routine job tasks. There is, however, variation in the frequency, size, and weight of materials to be moved according to job title [34]. A person who stocks shelves can perform lifts at a rate of one per second. The average lift rate per day is one per minute [25]. A single lift can involve carrying a container to a shelf and depositing the items on a shelf, which averages 40–60 s. Since the bulk of the material handling is done manually and often repetitively, over time, the repetitive and often forceful MMH motions contribute to overexertion injuries that lead to days-away-from-work and are associated with more workers' compensation claims [35].

Employers, practitioners, and researchers continue to seek solutions to these costly injuries and associated employee losses [36]. Traditional solutions, involving administrative controls such as training and policies, have had minimal long-term impact on the incidence and severity of overexertion injuries associated with MMH [37, 38]. Engineered solutions in the form of mechanical assist or lift devices are commonly used in large production and construction businesses, yet few, if any, of these assist devices have found their way into retail businesses during the past 30 years [39]. There are multiple reasons that may explain why most materials handling jobs in the retail sector have not benefited from the advances in material handling technology. Among the obvious factors are the initial cost, upkeep and

maintenance, and training. One of the less obvious is human nature, i.e., resistance to change.

Sensing an opportunity to provide engineering solutions for retail material handling tasks, NIOSH organized a first MMH workshop in 2012 [40]. Representatives from a dozen material handling manufacturers, associated with the Material Handling Industry trade organization, attended the workshop to learn more about the material handling needs of the 30 retailers, wholesalers, and warehousing representatives who attended. In response to the interest, two subsequent MMH workshops were held in 2012 and 2013. Despite the potential barriers to adopting new technology, there are multiple demographic and health-related forces in the trade sectors that are moving management towards the path of implementing ergonomic material handling technology.

5. CONCLUSIONS AND KEY POINTS

This was a first attempt to interview a subset of retailers about safety hazards and interventions for public presentation. Although the retailers reported MMH was their main safety problem, the 2009 BLS data revealed that contact-with-objects had a higher overall lost-time IR for the overall retail sector. Of the nine establishments interviewed, only three identified either contact-with-object or struck-by-object as an important safety hazard. We postulate that a main reason MMH is reported by retailers as their most important safety hazard is the long-term cost of over-exertion injuries, both from the medical side and from the number of days lost from work as compared to the costs associated with contact-with-object injuries. This statement is reinforced by the results from the annual Workplace Safety Index published by Liberty Mutual Research Institute for Safety [26, 41].

It was evident from both the practitioners' observations and from the BLS data that the grocery or supermarket industry is one of the highest risk retail businesses as measured with the IRs [2]. Since the early 1980s, there has been an expansion and growth of the large grocery and supermarket retailers. Along with this growth, there has been a parallel increase in MMH tasks. As a result, the grocery industries have been the subject for various guides to improve safety [42]. NIOSH and the NORA sector for WRT are also dedicated to increasing awareness about solutions for WRT injuries as they apply to the retail sub-sectors and specifically the grocery industry. We are currently examining new types of lift and rotational devices that would reduce awkward bending and reaching postures [43].

What we learned from this formative project can shape a more formalized data collection plan. One finding has been the degree to which retailers are reluctant to discuss their safety practices, even when anonymity is assured. Certainly, a main reason is that safety hazards causing injuries and fatalities reflect poorly on a firm's reputation. We believe a more effective approach is to reshape the discussion around the financial and humane benefits gained from enabling a healthy workforce that is capable of performing material handling jobs without increasing the risk of injury. We believe the best solution is to examine material handling jobs and consider the use of appropriate engineering changes and mechanical assists.

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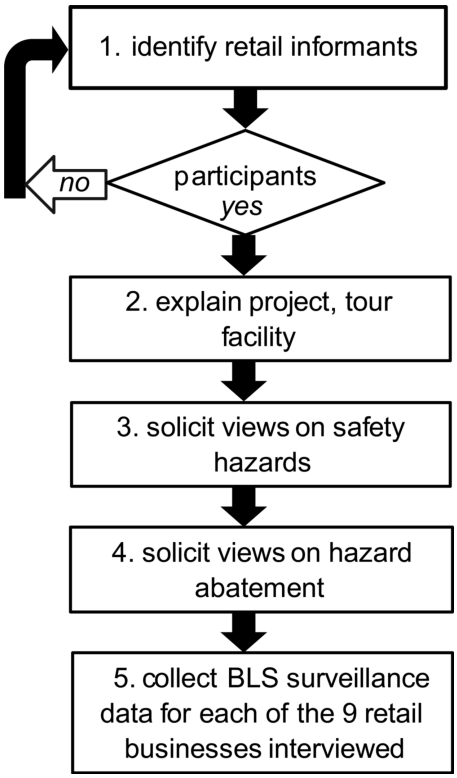

Figure1.
Process of collecting interview data.
Notes. BLS = Bureau of Labor Statistics.

TABLE 1

Nine Retailer Reports on Hazards and Interventions

Case NAICS Code	Nature of Hazards Reported or Discussed	Nature of Interventions: Completed or Discussed
1 Farm supply [44422]	• lifting and handling large heavy boxes, e.g., unassembled furniture at 68 kg per carton • lack of specialized manual lifting equipment for bags of materials, e.g., top soil >36 kg • presence of tools/machinery causing contact injuries • not all boxes are marked with weight and team lift requirements • machine guarding and electric hazards • trips and falls, e.g., on pallets • forklifts moving too fast within the facility, numerous incidents and near fatalities	• purchased 200 new carts to move materials to floor areas • trained managers to identify injuries, e.g., musculoskeletal • injury costs impact on profits presented to managers • safety is included in employees' review • on-the-job training provided by department heads • incentives for no lost time and for lower-than-average injury rates • covered corners of pallets used for displays • computerized training programs given on use of ladders and fork truck operators • need for more cost effective material handling equipment
2 Grocery store [44511]	• frequent lifting and twisting • heavy lifting boxes containers >25 kg • long periods of standing • jumping off moving lift trucks • wood pallets often too heavy and awkward at 15–20 kg • repetitive bending and twisting of hands, wrists, and upper body in checkout and shelving jobs • exposure to cold in walk-in freezers • overloading flat carts and narrow hand trucks obstructing vision • wet surfaces, weather, spillage, leaking display cases • use of sharp box cutters and knives in produce/meat departments causing cuts • bakery, deli, meat and fish department use electrical equipment that can cause serious cuts, bruises, amputations. • blades on slicing machines can cause serious injuries if machine guards are not working.	• converted to totes where small things (small and in small quantities), e.g., health and beauty items, can be mixed • trying more plastic pallets • computerized training programs (hazcom, lockout, confined space, ladder safety) • corporate training tools (monthly safety topics and materials; e.g., ladders, weather) • insurance company information support is good (fire protection, property damage) • Risk and Insurance Management Society network (can post to bulletin board) • cost information communicated, but no chargeback to stores • need training tools geared to their particular audience (including education level, interest, age, etc.) • need funds to attend safety conferences for grocery stores • need to introduce plastic pallets (5–12 kg), which are easier to lift • need to develop effective Functional Capacity Evaluation system to better match people to jobs
3 Supermarket [44511]	• backroom and shelf stocking lifting/trip hazards • unloading trailers under time pressure, stress • unloading/sorting nonpalletized general merchandise • unloading palletized trailers broken down and sorted to separate merchandise by aisle and location • special deliveries from vendors interrupt work flow • not enough staff due to excessive customer demands on sales floor or employee absences • no lift handles built into cartons • shelf restocking lots causing repetitive motions • third shift heaviest workload • overloading pallet trucks • not using step ladder or stool to load items on top sales shelf (over-shoulder height) • at checkout area, reaching and lifting heavy items (including cases of water and other liquids, large boxes, and bags >5 kg) • some checkouts have no input belt, requiring reaching • large customer queues (psychological stressor) • potential workplace violence with shoplifting • electric shock from slicers, grinders, saws, and other electrical appliances when used near water	• instituted 2-person lifts of heavy, bulky items, e.g., large-screen monitors or other large packages in lawn and garden, furniture, and other general merchandise departments • eliminated use of risers for storage of excess stock on top sales shelf and storage racks in backroom • management training in preventing employees from unloading, lifting, and stocking unsafely • encourage/train customers to keep heavy items in their carts (for hand-held rather than fixed-position scanning) • position cart to ease hand-held scanning, e.g., training through electronic signage • cashier provided training in handling groceries and scanning • design workflow so customer unloads on input belt and cashier brings cart through on cashier side of line • single queuing systems (to balance workload) • bag efficiently to minimize lifts onto cart • install input belts to reduce reaching and repositioning items • design work so cashiers do not stay in "cockpit" area, change their posture frequently • training in plastic and reusable cloth bags • training in implementing different types of queuing systems (for executives or store planners) • adjustable counters (determined by architects) • product displays that keep loose produce from falling to floor • have adequate cleaning support available • provide cleaning materials for employees and customers • educational program and associate recognition regarding benefits of 5-foot rule[a] for confronting shoplifters • need educational program for architects
4 Convenience store [44512]	• awkward postures required in unloading trucks and stocking displays (dairy, beer, sleeves of ice cream)	• eliminated transfer of beer by store employees, required delivery personnel unload directly • trying different cleaners/coatings for wet floors

Case NAICS Code	Nature of Hazards Reported or Discussed	Nature of Interventions: Completed or Discussed
	• floors trip/slips from weather, spillage, leaking cases • falls—drivers getting into/out of trucks • delivery driver often required to take pallets apart and repack on smaller skids for narrow doorways • retail workers required to unload store trucks • tripping on antifatigue mats • variety of loads on trucks • changing work hours • extra work due to items being repacked/ palletized • burns and cuts in food preparation • beverages stacked to ceiling or above shoulder height • crates lack rollers or wheels, must be lifted and moved • potential workplace violence with shoplifting • contact with energized equipment causes shock, burns	• “be safe for life” incentive program (awareness, safety culture) • changed from 9- to 4-kg bags of ice • attended National Association of Convenience Stores to learn about current safety practices • good networking with noncompetitive stores • good insurance company support • store leaders and shift leaders have checklists • retail stores add items to checklist and request support • annual reviews for leaders include safety • established new workplace violence guidelines • need a system for charging injury cost back to store to show management actual costs of injury/workers’ compensation • need adjustable sales counter to accommodate different-sized people (but still needs to accommodate product display) • need fountain drink syrup in smaller bags, e.g., <22 kg • need to add double doors at loading dock to enable pallets to be moved directly into store
5 Bakery [44529]	• lifting in awkward or bent-over positions • lifting multiple trays from tray dolly • lifting items above the shoulder (putting into showcases) • repetitive bending to pick up boxes or products from low shelves • leaning over table when picking up cakes, holding product at arm's length • slips and falls from icing and grease spills • reaches above the shoulder for items like sheet cakes • boxes are stored below the waist, closer to knee height	• employees were very well trained according to employer/ owners, which was the reason offered for no injuries • “hard line” on workplace violence policy (call police at any indication of problem; thorough investigation “no matter how trivial”) • need adjustable ladders • need better-designed carts for cookie trays
6 Department store [45212]	• lifting furniture that was large and awkward • unloading trucks and stocking shelves • lifting clothes and boxes of shoes • slips, trips, and falls from snow rain • spills, e.g., soap, cleaning products • seasonal workforce lacks conditioning to perform jobs involving stocking • prolonged standing in dress shoes • workplace violence • poor visibility in back rooms results in falls	• established campaign for safety and lifting: if you can't do it, get help • emplyees know what they can lift (thus, no weight limits) • new brighter bulbs installed in back rooms • teach lifting comfortably and naturally • manager training in workplace violence and how to recognize situations or signs of violence and call authorities • purchased antifatigue mats for sales/cashiers • no additional needs
7 Mail order store [45299]	• manual materials handling tasks: lifting, shelving, bending, carrying, packing, folding • working with arms elevated, often above the shoulder • bending to retrieve goods from deep totes • prolonged standing and bending over counters • repetitive motion from hand scanners • slips, trips, and falls from wet surfaces	• introducing adjustable, expanding skate wheel conveyors to reduce carrying and lifting motions • introducing spring-loaded totes to reduce bending while retrieving merchandise • adding adjustable height workstation tables and adjustable checkout units for customer service employees • lowering clothing racks to shoulder height (134 cm) to reduce working with arms elevated at shoulder height • purchasing special pistol-grip scanners to reduce awkward wrist, arm, and shoulder postures • slips, trips, and falls addressed by improvements in maintenance of aisles and floor areas, and reduced use of floor mats that can cause trips and falls at store entryways • no additional needs
8 Office supply store [45321]	• manual lifting related to stock retrieval and putting away • repetitive motion from moving products from one location to another • lifting of furniture, monitors, printers into customers’ cars and trucks • upper-extremity lifting, moving materials overhead • struck by objects from pallet movers, pallets, flat carts • slips, trips, and falls caused by liquids on floors • seasonal workers need more training in lifting furniture, e.g., bookcases, file cabinets	• movable flexible conveyors used to unload delivery trucks to reduce carrying boxes • corporate office provide safety training each quarter with performance evaluations • training provided in using appropriate postures for lifting • providing gloves and lifting belts for moving furniture, file cabinets • cashiers are now using hand scanners for heavy items • rearranged items on shelves to keep the weight of objects at the bottom and top shelves at no more than 10 kg • now storing boxes of printer/copier paper on pallets or risers to reduce lifting from floor • no additional needs

Case NAICS Code	Nature of Hazards Reported or Discussed	Nature of Interventions: Completed or Discussed
9 Used merchandise store [45331]	• every employee required to lift, carry, and stack merchandise—harder for older employees • repetitive motion from folding and pricing goods • workplace violence, frequently due to store's location • motor vehicle injuries attributed to lack of training and inexperienced drivers	• employees rotate between folding, pricing, racking • racks placed on casters—easier to move • pricing system uses color-coded plastic tags (easier for cashiers to recognize mark-downs and less over-ride errors and stress) • caution tape used to alert others that pallets are being unloaded • adjustable clothing racks purchased for back storage room to allow shorter employees to reach rods • bottoms of racks padded to keep from hitting and bruising knees • spring-loaded totes purchased—less bending • safety chains added to access doors of high-wall clothing carts to keep door from accidentally falling on employee's head • guardrails installed on loft areas • pricing guns now equipped with protective caps to reduce skin cuts and punctures • need refresher driving course every 2 years for motor vehicle operators • need back-up alarms added to trucks to reduce injuries to employees and the public

Notes. NAICS = North American Industry Classification System

[a] distance of ~150 cm, which employee should stay away from potential shoplifter to avoid injury.

TABLE 2

Examples of Retailer Interventions and Abatement Plans Drawn From Table 1[a]

Administrative Changes: Instituted Polices	Administrative Changes: Conducted Training	Engineering Changes
• institute employee rotation schedules • suppliers required to provide smaller, lighter packages, when feasible • managers required to review injury costs and impact on profits • safety required to be part of annual performance review • incentives introduced for providing suggestions to reduce safety hazards • safety checklists introduced for use by shift leaders • established incentive and awareness programs, “be safe for life” • work with insurance companies to reduce hazards and risks • introduce totes to use in storing and shelving smaller items • purchase lighter weight totes • managers now review workers’ compensation data each month • examine different types of functional capacity evaluation systems to improve the match of people to jobs • policy instituted for 2-person lift of large items • policy to purchase ergonomically designed items	• refresher driving course • managers training to identify recordable injuries • adding more computerized training programs required for managers • training for department heads on preventing sprains and falls, using forklifts, handling hazmat • established campaign for safety and lifting • training in how to lift • training for managers on identifying signs of workplace violence • training program on safe loading and unloading trucks and pallets, and stocking shelves • training on instituting different types of queuing systems at checkout stands • training on bagging groceries to avoid strain • training on approaching shoplifters	• introduced adjustable skateboard conveyors for unloading trucks • introduced spring-loaded totes to keep materials at waist height • adjusted clothing racks to shoulder height of females • purchased pistol grip scanners to reduce wrist stress • purchased adjustable workstations • covered corners of pallets in display areas to reduce injuries to legs and feet • replace single doors with double doors at loading docks • purchased new redesigned carts to hold boxes and containers during stocking • introduced adjustable counters • purchased product displays that prevent produce from falling to floor • purchase steel rolling warehouse ladders with handrails fixed at 56 °.

Notes.

[a] caution: the interventions listed here have not been evaluated as to their effectiveness, and as a result should only be viewed as an indicator of what is being tried, not necessarily what should be done.

TABLE 3

Incidence Rates and Case Characteristics for Retail Worksites Identified by Practitioners[a]

Characteristics	Private Industry	Retail Overall	Farm Supply	Grocery Store/Supermarket[b]	Convenience Store[c]	Bakery	Department Store	Mail Order Store	Office Supply Store	Used Merchandise Store
NAICS Code		44–45	44422	44511	44512	44529	45212	45299	45321	45331
DAFW	106.4	118.4	213.8	154.9	117.3	62.4	127.6	134.0	82.7	141.0
Injury type R5										
strain sprain	41.8	47.8	53.1	64.1	54.6	18.2	46.6	65.1	22.0	53.9
soreness pain	11.3	13.7	17.5	13.7	17.0	6.2	16.6	16.9	11.3	15.6
bruises	9.1	11.6	6.6	16.9		4.4	15.9	11.9	13.7	26.4
cuts, punctures	9.6	12.0	33.2	25.7	11.1	21.1	8.1	13.0	—	9.0
Body part R6										
trunk	35.7	40.1	57.9	52.6	47.3	16.4	40.6	49.9	29.5	62.3
upper extremity	24.3	25.2	60.1	47.1	54.2	25.4	20.8	23.3	7.6	18.7
lower extremity	23.6	28.5	41.9	31.6	—	10.8	29.8	43.6	27.8	33.4
Injury source R7										
container	12.6	23.5	18.1	43.6	9.5	16.6	29.5	48.2	11.2	22.0
worker movement	14.4	14.4	5.4	20.5	16.4	5.2	17.2	7.4	8.7	14.0
floor	21.5	23.4	32.6	26.0	36.4	9.4	27.2	31.9	27.6	52.0
vehicle	9.0	10.6	19.8	10.4	12.0	—	9.6	4.9	1.8	—
Event exposure R8										
contact-with-object	28.1	33.8	79.5	49.3	21.6	24.9	35.1	46.4	26.1	26.2
falls-to-the-same-level	15.6	18.0	23.6	22.0	36.8	9.6	23.0	28.8	15.5	31.4
overexertion	25.0	32.2	41.1	43.3	37.9	14.2	33.1	45.5	19.7	43.2
repetitive motions	3.4	2.8	—	6.3	—	—	2.9	—	—	6.6
violence	2.5	2.0	—	1.2	20.2	—	1.7	—	—	—
transportation	4.6	3.8	6.7	1.4	—	2.5	1.3	—	—	—
No. employees	1111469.1	15058.1	105.3	2387.2	139.9	120.2	1533.3	335.2	147.3	102.8

Notes.

R5 = detailed industry by selected injury type: http://www.bls.gov/iif/oshwc/osh/case/ostb2451.pdf; R6 = detailed industry by selected part of body affected: http://www.bls.gov/iif/oshwc/osh/case/ostb2452.pdf; R7 = detailed industry by selected injury source: http://www.bls.gov/iif/oshwc/osh/case/ostb2453.pdf; R8 = detailed industry by selected event/exposure: http://www.bls.gov/iif/oshwc/osh/case/ostb2454.pdf; — = insufficient data to provide values and ensure anonymity.

[a]2009 nonfatal occupational injuries/illnesses involving days-away-from-work (DAFW) per 10000 full time equivalent employees

[b] includes both grocery store and supermarket, sharing the same North American Industry Classification System (NAICS) code

[c] 2008 Bureau of Labor Statistics data; not enough data in 2009 to ensure anonymity of establishments